

FLIGHT

The
AIRCRAFT
ENGINEER
AND
AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

May 31	Wilbur Wright Lecture, "The Relation between Aeronautical Research and Aircraft Design," by Dr. Joseph Ames, before R.Ae.Soc.
June 23	Grosvenor Challenge Cup, Lympne
June 25-30	International Air Congress, London
June 30	R.A.F. Aerial Pageant, Hendon
July 20-21	Air Race for King's Cup
July 16	Unveiling of R.A.F. Memorial by H.R.H. The Prince of Wales
July 20	Göteborg Exhibition
Aug. 1	Entries close from British Competitors for Schneider Cup
Aug. 3-14	Rhön Gliding Competition
Aug. 6	Aerial Derby
Aug. 6-27	French Gliding Competition, near Cherbourg
Aug. 8-12	F.I.A. Conference, Göteborg.
Sept.	Light 'Plane and Glider Competitions
Sept. 28	Gordon Bennett Balloon Race, Belgium
Sept. 28	Schneider Cup Seaplane Race at Cowes
Oct. 14	Beaumont Cup Race at Istres, France
Dec. 1	Entries close for French Aero Engine Competition

EDITORIAL COMMENT.



ALTHOUGH considerably less than one-half of the year has passed, there is every justification for believing that 1923 will go down in history as one of the most important in the existence of aviation. Not only were the 1923-24 Air Estimates very much larger than any Air Estimates have ever been before, but the country and the Government are coming to the conclusion that even the increases provided for are insufficient. It is sad to think that, owing to a misguided desire for economy, Britain has lost the leading position which she held at the end of the War, 1914-18, but our consolation must be that at long-last the error has been realised, and that consequently the way has now been opened wider to advance. Incidentally, and by way of consolation for past failings, the future may well prove that in the long-run the country is none the worse for the decline and subsequent accession. If, indeed, we had gone ahead as we were at the end of the War, it appears unlikely that the R.A.F. would have been by now the very efficient service that it is, although numerically it would have been stronger. Similarly as regards the industry, the four or five years of depression have been extraordinarily trying, and designing and construction firms that matter have managed to survive with the greatest difficulty only. Nevertheless, most of the War-time methods—not always efficient, although sufficiently effective—have been eliminated, and a sounder, if less feverish, activity substituted. Thus it may be that all things in the end work for the good, and that the old-fashioned British spirit of *festina lente* will once more prove to have been not so bad after all, always providing that we make up our minds that from now onwards we will go forward with adequate strides in the air.

Fortunately there is every indication that such is, in fact, our intention. In the House of Lords on May 9 Lord Birkenhead asked the Government what their policy was in relation to the standard of air strength which the country required, pointing out that whereas we have 34 air squadrons and 395 machines, France had 140 squadrons and 1,260

machines. He pointed out that in many ways the disappearance of our Air Force was far more serious than the disappearance of our armies, and stated as his belief that nothing less than a one-Power standard would content public opinion. Lord Birkenhead also made the significant admission that, although he had done something to mitigate the effect of the Geddes recommendations in relation to the Air Force, *he would have gone still further had he been more fully informed.*

Lord Salisbury, in replying, said that undoubtedly the air strength of any Power, friendly or otherwise, must react upon ourselves. The present Government had lost no time, and no greater haste could have been made in the provision of air strength, working on the ordinary rules which prevailed in times of peace. It would be premature, he said, to say what final conclusions the Committee which was enquiring into the subject had come to, but the Government had reached the conclusion that a considerable increase in the Air Force would be necessary.

Personally we have not the slightest doubt that when that time comes the wholehearted support of a great majority in the House will be forthcoming, and consequently we are looking forward with much greater confidence to the future than we have done for several years.

A Real Air Minister When it was first announced that the Air Minister in Bonar Law's Government was to be Sir Samuel Hoare, there were those who were not without misgivings. Sir Samuel was an unknown quantity as far as air matters were concerned, and naturally there was some speculation as to the wisdom of the choice, and all were agreed that it was a case of wait and see. And the Prime Minister's choice has been most bountifully justified. Sir Samuel had not been in office long before it became apparent that he was doing everything possible to master the very intricate subject of the air, and since then Sir Samuel has been steadily gaining the confidence, not to say admiration, of all interested in aviation. His most recent step—that of going for an air tour of the European airways during the Whitsuntide recess—will further cement the confidence of the nation and of the aviation community in our present Air Minister, and the feeling will be further strengthened by the fact that Sir Samuel is to be accompanied by Lady Hoare. Another member of the party will be our very energetic and determined Director of Civil Aviation, General Sir Sefton Brancker, who makes use of the air regularly for his lightning trips. In fact, only by so doing has he been able to create that popular impression that he can be in two places at once.

As a further proof of the way in which he enters into the problems of the air, mention may be made of the speech which Sir Samuel Hoare broadcasted this week from the London Broadcasting Station. Using this very up-to-date means of appealing to the country, Sir Samuel called attention to the very important question of the defence of London against air attack, and explained in very lucid terms the principles involved. Such a real "live" Air Minister is of inestimable value to the country and Empire, and it is to be hoped that Sir Samuel will see his way to remain in office for a very much longer term than have his predecessors.

The Helicopter Prizes

At last the long-expected Air Ministry Prize for helicopters has been announced. The conditions will be found on another page of this issue of FLIGHT. It will be seen that the tests are divided up into sections, and that prizes of varying amounts are offered for various single or combinations of performances. Thus for test (a) a competitor may get £5,000 for climbing to 2,000 ft. and descend again without damage. The other tests, or combinations of tests, are more difficult, and are accordingly to be awarded proportionately larger prizes. If we are to have helicopter prizes at all, the regulations adopted are probably as good as could be expected, but to us it seems very doubtful whether any useful purpose will be served by spending money in this direction. There is this consolation, however, that the tests are pretty stiff, and that it is not likely that any competitor will run off with more than a very few thousands at the most.

We can well believe that, as a matter of fact, the Air Ministry itself is not a great believer in the helicopter, but with so much activity going on abroad, and a certain modicum of success being attained, the Air Ministry probably felt that the country could not afford to disregard giving encouragement to any possible avenue of development, even one which does not appear very promising. Nevertheless, we could have wished to see the £50,000 devoted to research in other directions, and incidentally it looks as if the Brennan experiments cannot have been very successful, otherwise it would appear that there was no necessity for offering prizes. As it is stated that the Brennan machine will not compete, it may be assumed that if it were capable of fulfilling the conditions the *raison d'être* of the Air Ministry's offer would disappear, and the only logical conclusion to which one can come is that the Brennan cannot and has little prospect of reaching 2,000 ft. and descend safely, let alone fulfil the much more exacting requirements of the other tests. However, as we have already said, there is probably no great danger of anyone running off with the money.

The "AIRCO" and Compensation

The vital value of D.H. aeroplanes, not only to this country, but to the Allies generally during the War is too well realised to need pointing out to those connected with aviation. The general public, however, cannot be expected to know details, and, consequently, we think it is a very timely open letter which Mr. Holt Thomas has addressed to the country, stating the seemingly unfair treatment which the shareholders of the Aircraft Manufacturing Co. have received from the Government. As Mr. Holt Thomas points out, the Government gave a definite undertaking that compensation should be paid, and makes the incontrovertible point that if the British Government had decided to make a present of the designs to the United States Government, then it should be at the cost of the British Government, and not at the cost of the shareholders of the Aircraft Manufacturing Company. The company is powerless, and has no legal appeal against the inadequate award, but we do think that in all fairness it behoves the Government to reconsider the position and to see that the shareholders are not penalised for coming forward and putting their money into a firm whose work was of the very greatest national benefit.

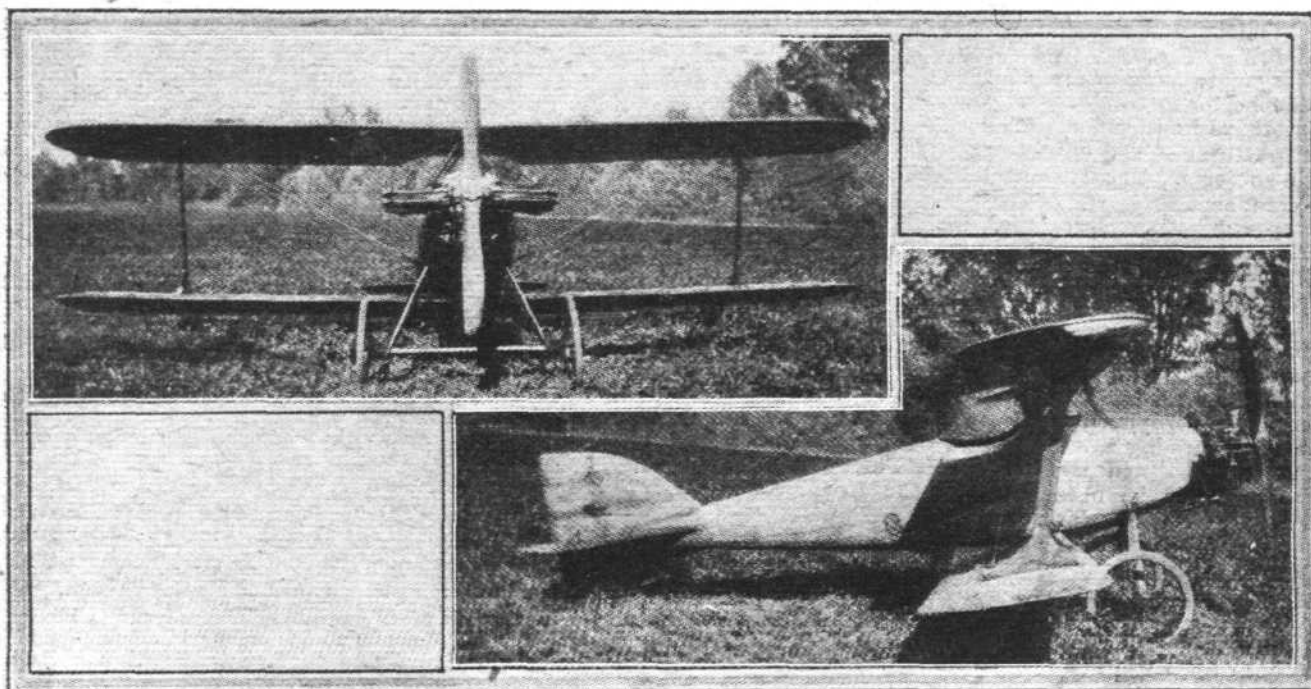
THE SWANSON MODEL 3 SPORT 'PLANE

THE little sporting biplane shown in the accompanying illustrations was designed and constructed by S. Swanson of Vermillion, South Dakota, U.S.A., and was given its first test flights last September. The test pilot on this occasion was Lieut. Vert Rogers, and on the first attempt he took the machine off after a short run over rough ground, thick with undergrowth, made one circuit of the field and then made a perfect landing. He took off again immediately, and climbing to a height of 1,000 ft. circled over Vermillion for about 15 mins., making another excellent landing at the conclusion. He reported that the machine was well balanced and light on the controls, answering promptly to the various manoeuvres.

Upper and lower planes are of "one-piece" construction, the spars being of routed I-section spruce, spliced in the centre to form a continuous beam with a dihedral angle of 4°. The webs of the ribs are of bass-wood, with the usual lightening holes, and the cap strips of spruce. The upper plane has a

The fuselage is of the girder type, built-up of spruce, with ash longerons forward of the cockpit. The fuselage tapers to a horizontal knife-edge at the rear, and is given a good streamline by means of bass-wood stringers. The cockpit is exceptionally roomy for so small a machine. A 3-hr. petrol tank is mounted forward of the cockpit, just over the c.g. The engine is separated from the fuselage by an aluminium partition, and the cowling is of 20 ga. aluminium. The engine is an air-cooled 2-cyl. opposed Lawrence of 28 h.p. (1,500 r.p.m.), and the tractor screw has a diameter and pitch of 5 ft. 6 ins. The carburettor is mounted outside the fuselage, thus minimising the risk of fire.

The undercarriage is of the V-type, with a split axle, hinged 9 ins. on each side of the centre, and sprung by the usual rubber shock-absorbers. The struts are of streamline ash, and the wheels are 24 ins. by 2 ins. Standard stick and foot rudder-bar control is fitted, the movements of the surfaces being geared down.



Two views of the Swanson Model 3 Sport 'Plane, 28 h.p. Lawrence engine.

cut-away at the centre over the cockpit, and is fastened to the centre N-struts by four bolts. The lower plane is secured to the underside of the fuselage by three bolts. Ailerons are fitted to the lower plane only, and the aileron control wires run within the lower wing. Upper and lower planes are separated by a single I-strut each side. These struts are of built-up spruce laminations. The landing and flying wires are $\frac{1}{8}$ in. cable, the flying wires being double.

The fixed horizontal stabiliser is built into the fuselage, and has an unsymmetrical streamline section, the top camber being two-thirds and the bottom camber one-third. The rear spar, to which the elevators are hinged, is a continuous beam forming part of the fuselage stern post. The elevators are of the divided type, with a negative rake of 20°. The vertical fin is also built into the fuselage, and projects through on the lower side, forming a small lower fin, to which is attached the rubber-sprung ash tail skid. The hinged edges of the elevators and rudder are rounded, and fit into a groove in the edges of the fixed surfaces so that no gap is left between the surfaces, thus ensuring a smooth and even flow of air. There is no external bracing on the tail plane whatever, and the control horns are built into their respective surfaces.

The principal characteristics of this machine are:—

Span	..	..	..	18 ft. 9 ins.
Chord	..	..	..	2 ft. 10 ins.
Gap	..	..	..	3 ft. 4 ins.
Stagger	..	..	..	1 ft. 2 ins.
Overall length	..	..	..	15 ft.
Wing curve	..	..	..	U.S.A. 15.
Angle of incidence (top)	..	..	..	3½°
Angle of incidence (bottom)	..	..	..	2°
Decalage	..	..	..	1½°
Dihedral	..	..	..	4°
Area of main planes	..	..	..	100 sq. ft.
Area of ailerons	..	..	..	12 sq. ft.
Area of stabiliser	..	..	..	7 sq. ft.
Area of elevators	..	..	..	5 sq. ft.
Area of fin	..	..	..	3 sq. ft.
Area of rudder	..	..	..	3 sq. ft.
Weight empty	..	..	..	370 lbs.
Weight with full load	..	..	..	570 lbs.
Weight per h.p.	..	..	..	20 lbs.
Weight per sq. ft.	..	..	..	5.7 lbs.
Speed range	..	..	..	40-90 m.p.h.

Air Service Accounts

THE Air Ministry Appropriation Account has just been published as a Parliamentary Paper (No. 31), from which the following figures may be of interest. The actual gross expenditure in the year 1921-22 was £16,394,680, which was less than the estimate by £3,388,286; and the actual receipts were £2,770,631, or £1,399,141 more than the estimate. The net surplus is £4,787,427. The total awards to inventors made

during the year amounted to £280,342, whilst under the heading of "Balances Irrecoverable" is included the sum of £96,415 for stocktaking deficiencies at the R.A.E. due to machines crashed in France during the War and duplications of store charge; omissions of accounting adjustments in respect of spare engine parts built into larger parts or complete machines; and deficiencies disclosed at the closing down of a balloon stores depot in November, 1921.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

THE KING'S CUP

(Circuit of Britain Handicap)

Presented by HIS MAJESTY THE KING

HIS MAJESTY THE KING has graciously presented a Cup to the Royal Aero Club for an Air Race this year.

It is to be a Circuit of Britain Race on Handicap on the same lines as last year, extending over two days, viz., Friday and Saturday, July 20 and 21, 1923.

First Day, Friday, July 20

London to Birmingham	106 miles
Birmingham to Newcastle	168 "
Newcastle to Glasgow	120 "

Second Day, Saturday, July 21

Glasgow to Manchester	183 miles
Manchester to Bristol	130 "
Bristol to London	103 "

Competitors.—The entrant and pilot or pilots must be British subjects. The entrant must be an individual and not a company.

Aeroplane.—The aeroplane, including the engine or engines, must have been entirely constructed in the British Empire.

Repairs.—Individual replacements and repairs to the aeroplane and engine may be made, but neither must be changed as a whole. Any repairs or adjustments must be carried out by the pilot and/or crew.

Spare Parts.—Only such spares are permitted as are carried in the aeroplane.

The handicapping will be carried out by a Handicapping Committee appointed by the Club. Full particulars and Entry Form can be obtained from the Royal Aero Club, 3, Clifford Street, London, W. 1.

THE AERIAL DERBY, 1923,

at London Aerodrome, Hendon, on

Monday, August Bank Holiday, August 6, 1923

Prizes

The following Prizes will be presented by the Royal Aero Club:—

Fastest Time (winner of the Aerial Derby), Trophy and £300.

Handicap.—1st Prize, Trophy and £100; 2nd Prize, £50; 3rd Prize, £25.

The course is approximately 200 miles, and will consist of a double circuit of London, starting from London Aerodrome, Hendon.

Full particulars and Entry Form can be obtained from the Royal Aero Club, 3, Clifford Street, London, W. 1.

GROSVENOR CHALLENGE CUP

First Prize, £100; Second Prize, £50.

Saturday, June 23, 1923

Competitors.—The entrant and pilot or pilots must be British subjects. The entrant must be an individual and not a company.

Aeroplane.—The aeroplane, including the engine, must have been entirely constructed in the British Empire. The engine must not develop more than 150 h.p.

Course.

Lympne (starting place) to Croydon ..	55 miles
Croydon to Castle Bromwich	106 "
Castle Bromwich to Bristol	85 "
Bristol to Croydon	103 "
Croydon to Lympne (finish)	55 "

404 miles

Entries.—The entry fee is £2. This fee, together with the entry form, must be received by the Royal Aero Club, 3, Clifford Street, London, W. 1, not later than 12 noon on Wednesday, June 13, 1923.

Full particulars and Entry Form can be obtained from the Royal Aero Club, 3, Clifford Street, London, W. 1.

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, May 9, 1923, when there were present: Lieut.-Col. F. K. McClean, A.F.C., in the Chair, Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F., Lieut.-Col. M. O. Darby, Lieut.-Col. John D. Dunville, C.B.E., Capt. D. G. Murray, Lieut.-Col. A. Ogilvie, C.B.E., Mr. T. O. M. Sopwith, and the Secretary.

Election of Members.—The following new Members were elected:—

Flying Officer E. A. W. Kent.
Roland Welch.

F.A.I. Conference, Gothenburg, August 8-12, 1923.—

It was decided to place the following items upon the Agenda:—

1. Customs Carnet for Touring Aircraft.
2. Timing of Speed Records.

Lieut.-Col. M. O'Gorman, C.B., was appointed to represent the Club at the Conference.

Racing Committee.—The report of the Racing Committee dealing with the following matters was received and adopted:—

Motor Glider Competitions.
Rules for Starting Air Races.
The King's Cup Race.
Schneider Cup Regulations.
Aerial Week-End.

Aviator's Certificate.—The following Aviator's Certificate was granted:—

7941. John Denis Mansfield Robinson. May 4, 1923.

RACING COMMITTEE

A MEETING of the Racing Committee was held on Wednesday, May 9, 1923, when there were present: Lieut.-Col. M. O. Darby, in the Chair, Lieut.-Col. W. A. Bristow, Lieut.-Col. John D. Dunville, C.B.E., Lord Edward Grosvenor, Lieut.-Col. F. K. McClean, A.F.C., Mr. W. O. Manning, Lieut.-Col. A. Ogilvie, C.B.E. In attendance: Comdr. James Bird, Mr. T. O. M. Sopwith and the Secretary.

The King's Cup.—Letter was read from His Majesty the King approving the Regulations and date for the Circuit of Britain Race.

Aerial Derby.—It was decided to offer the following prizes for the Aerial Derby to be held on August Bank Holiday:—

Fastest Time (winner of the Aerial Derby), Trophy and £300.
Handicap.—1st Prize, Trophy and £100; 2nd Prize, £50; 3rd Prize, £25.

London Aerodrome, Hendon.—The arrangements for the use of the London Aerodrome, Hendon, for this year's races were discussed.

Schneider International Seaplane Race.—The Supplementary Regulations for the starting of the competitors in the Schneider Race, as submitted by the Rules Sub-Committee, were considered and approved.

GLIDING COMMITTEE

A MEETING of the Gliding Committee was held on Monday, April 23, 1923, when there were present: Lieut.-Col. M. O. Darby, in the Chair, Lieut.-Col. W. A. Bristow, Mr. E. C. Gordon England, Maj. O. T. Gnosspelius, Lieut.-Col. F. K. McClean, A.F.C., Mr. W. O. Manning, Lieut.-Col. A. Ogilvie, C.B.E., Mr. F. Handley Page, Capt. W. H. Sayers and the Secretary.

The Duke of Sutherland and "Daily Mail" Prizes.—The draft Regulations were considered and approved.

Abdulla Prize.—The offer of a Prize of £500 by Messrs. Abdulla and Co. was considered, and Lieut.-Col. F. K. McClean, A.F.C., Lieut.-Col. M. O. Darby and the Secretary were appointed a sub-committee to meet Messrs. Abdulla and Co. and settle the details.

Offices: THE ROYAL AERO CLUB,

3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

BRITISH HELICOPTER COMPETITION

Prizes of £50,000 Offered

THE Air Ministry announces that the Air Council have decided, as announced by the Secretary of State for Air, to offer prizes amounting to £50,000 for the successful completion of certain flying tests applicable to a helicopter or equivalent type of flying machine.

The conditions of entry and the tests to be carried out are as follows:—

(1) The Air Council will subject to and in accordance with the Conditions of the Competition award prizes amounting to the sum of £50,000 in connection with the production of a flying machine which carries out, independently of the existence of any buoyant structure or of power or assistance supplied from any source external to the machine and to the satisfaction of the Judging Committee appointed by the Air Council, the tests specified in Condition 4.

(2) All entries by persons intending to enter flying machines for the competition must be sent to the Secretary, Air Ministry, before April 30, 1924. No entry received after April 30, 1924, will be accepted.

(3) Flying machines when undertaking the tests named in Condition (4) will be required to carry a pilot, sufficient fuel for one hour's flight, and 150 lb. of military load.

(4) The following are the tests to be undertaken by flying machines entered for the competition:—

Test (a) The flying machine must make (i) in a ground wind not exceeding 5 miles per hour; and (ii) in a ground wind exceeding 10 miles per hour, but not exceeding 20 miles per hour, a vertical flight from a position of rest on the ground to a height of 2,000 ft. and descend and land without damage.

Test (b) The flying machine must make, in a ground wind not less than 5 miles per hour and not exceeding 20 miles per hour, a vertical flight from a position of rest on the ground to a height of 2,000 ft. and remain in the air, at an altitude of 2,000 ft., for half-an-hour, in a stable attitude, over a ground area determined by the Judging Committee, and thereafter descend and land without damage.

Test (c) The flying machine must make a vertical flight from a position of rest on the ground to a height of 2,000 ft., and must fly over a prescribed closed circuit of not less than 20 miles in length at an approximate constant height of not less than 2,000 ft., and at an air speed of not less than 60 miles per hour, and thereafter descend and land without damage.

Test (d) The flying machine must make, in a ground wind not less than 5 miles per hour or exceeding 20 miles per hour, a vertical flight from a position of rest and be manoeuvred while in the air over a given ground point as directed by the Judging Committee, and must descend vertically from a height of not less than 500 ft. without engine, and alight without damage within a confined circular area on the ground having a radius of 100 ft. and the given ground point as centre.

(5) The term "vertical flight" in para. 4 means a flight executed from the starting point without appreciable divergence from a vertical line passing through such starting point.

(6) A separate entry must be sent in respect of each flying machine intended to be entered for the competition. The Air Council reserve the right to refuse any entry sent in.

(7) Entries must be made by the owner or owners of the flying machine upon the form of entry provided by the Air Council, and must state the name, address, profession and nationality of the owner or owners, and the names, addresses and nationality of any other person or persons having an interest in the machine.

(8) Entrants will be required as a condition of the acceptance by the Air Council of the entry to furnish the Air Council with their written acceptance of the conditions of the competition, together with the written consent to the entry and acceptance of the conditions of the competition of any person or persons having an interest in the flying machine entered.

(9) Entrants must also if called upon to do so furnish the Air Council with such further document, declaration or other evidence as the Air Council may require to satisfy them that the entry is made with the consent of any person or persons having an interest in the flying machine entered, and that such person or persons accept and agree to be bound by the Conditions of the Competition.

(10) The Air Council reserve the right to add to or alter any of the conditions of the competition other than the test to be undertaken by flying machines and the amounts of the prizes to be awarded for each test.

(11) Each entrant must at the time of entry furnish particulars of all patents which have been applied for or

granted and of all designs for which registration has been applied for or granted in respect of inventions or designs embodied or made use of in or in connection with the flying machine entered.

(12) Each entrant must at the time of entry furnish the Air Council with a description and general arrangement drawings of the flying machine entered, and must give such further information in regard thereto as may be required by the Air Council, and at the conclusion of any test named in Condition 4 the Air Council or any person or persons appointed by them shall be at liberty to examine any flying machine which has undergone the test and to take records for the use of the Air Ministry of such measurements, particulars and details as may be desired, and the entrant, his servants and agents shall afford all reasonable facilities and assistance for the purpose.

(13) The Air Council will in due course, after the date on which entries close, proceed with the tests of flying machines which have been entered for the competition, and will notify entrants of the time and place appointed for tests of the machines entered by them, but no time and place will be notified to the entrant of any machine and no test of any machine will be held until all the conditions of the competition required to be fulfilled by the entrant of such machine have been complied with.

(14) In the event of any one of the four tests named in Condition 4 not having been held in respect of any flying machine entered for the Competition within a period of twelve months from the date on which entries close, such machine shall be deemed to be withdrawn from the competition by the entrant as respects any test or tests which have not then been held in respect of the machine, and the machine shall be disqualified from competing further for any prize other than the prize or prizes (if any) allocated under Condition 19 in respect of the test or tests which the machine has carried out.

(15) The tests named in Condition (4) will be carried out under the control and direction of the Judging Committee appointed by the Air Council, and the Judging Committee may make such rules with regard to the conduct and carrying out of the tests, or any of them (including disqualification of competing machines), as they may think necessary. All instructions given to entrants or their servants or agents by the Judging Committee, and all rules made by them, will be duly observed by entrants and their servants or agents.

(16) The decision of the Judging Committee appointed by the Air Council on any matter connected with the tests or the allocation of the prizes, and the decision of the Air Council on any matter connected with or arising out of the Competition, shall be final and without appeal.

(17) No application by entrants for financial assistance from public funds will be entertained by the Air Council, who will undertake no responsibility in respect of any expenses incurred by entrants in connection with the design, construction, transport or test of flying machines entered by them. All such expenses (including travelling and other expenses of the Judging Committee appointed by the Air Council in any case in which an entrant obtains the consent of the Air Council to the test of the entrant's machine being held at some place other than that originally appointed by the Air Council) must be borne by the entrant.

(18) Flying machines entered for the Competition will at all times be under the charge and control of the entrant, and no liability will be accepted by the Air Council for injury or damage to person or property caused to or by the entrant of any machine, or any person or persons having an interest in the machine or his or their servants or agents in connection with the Competition.

(19) The prizes in connection with the Competition will be as follows:—

Subject to and in accordance with the Conditions of the Competition: (i) a sum of £5,000 will be awarded in respect of test (a), named in Condition (4); (ii) a further sum of £15,000 will be awarded in respect of tests (a) and (b), named in Condition (4); (iii) a further sum of £20,000 will be awarded in respect of tests (a) and (c), named in Condition (4); and (iv) a further sum of £10,000 will be awarded in respect of tests (a) and (d), named in Condition (4).

(20) The prizes named in Condition (19) will be awarded to the entrants of flying machines which are submitted for test in accordance with the Conditions of the Competition at the appointed time and place, and which successfully and to the

satisfaction of the Judging Committee appointed by the Air Council carry out the tests specified in the presence of and under the direction of the Judging Committee.

(21) In the event of two or more flying machines successfully and to the satisfaction of the Judging Committee appointed by the Air Council carrying out any test or tests for which a separate prize is allocated under Condition (19) (i), (ii), (iii) and (iv), the prize allocated for such test or tests will be divided equally, or in such proportions as the Judging Committee may determine, between the entrants of the successful machines.

(22) The Air Council shall not be bound to recognise any claim, right or interest of any person or persons having an interest in any flying machine entered for the Competition other than the entrant of the machine, and the receipt of the

entrant shall be a sufficient discharge for any payment made by the Air Ministry in respect of any prize or share of a prize awarded.

(23) No part of the above-mentioned prizes will be awarded in respect of the helicopter now being constructed by Louis Brennan, Esq., C.B., for and on behalf of the Air Council.

(24) In the event of any of the prizes not being awarded such prize will again be offered for competition within a further period of one year from the date of the announcement by the Air Council of the result of the original tests upon terms to be then announced.

(25) All communications in respect of the Competition should be addressed to the Secretary, Air Ministry, Admiralty House, Kingsway, London, W.C. 2.

A LARGER AIR FORCE

It was stated in the House of Lords on Wednesday, May 9, that it was the intention of the House of Lords to increase the strength of the Air Force. Lord Birkenhead asked the Government what information they had as to the construction of aircraft in Germany (1) for military and naval purposes and (2) for commercial purposes, and what was the policy of the Government in relation to the standard of air strength which the security of this country required? He reminded the House that at the time of the Armistice this country had an Air Force which was unsurpassed by any air force in the world. At the earliest possible moment after the war all our vast military preparations were, rightly so under the circumstances, abandoned.

In many ways the disappearance of our Air Force was far more serious than the disappearance of our Armies, because for hundreds of years we had been content on the military side with a small but extraordinarily competent professional Army. We were always able to comfort ourselves with the reflection that we had a Navy which in those happy and secure days we used to speak of as the Navy that was of the two-Power standard. The air menace at that time had not arisen. We could afford to be indifferent to military inferiority. Those in authority could not justify themselves before the nation if they were compelled to say that there existed a Power, however friendly, against whom we were in a position of inferiority so striking that a defence would be almost impossible.

This country possessed 34 air squadrons and 395 machines, compared with 140 French squadrons and 1,260 machines. That disproportion in the strength of two neighbouring countries, however friendly their relations might be, was so alarming that no Government could allow it to continue. The subject was now under the consideration of the Committee presided over by Lord Salisbury, and he would not anticipate in any way the decisions of that Committee. His purpose was to persuade the House and the country that the problem of air defence in the future was as vital a question as the strength of the Navy had been to their predecessors for the last thirty years.

He asked the special question about Germany because he desired to have it made plain whether there was any such formidable menace in the centre of Europe as a section of the Press had attempted to convey. He had read statements to the effect that there was a feverish construction of aircraft taking place both in Germany and in Russia under the guidance of German officers. All the information available to him as a private member of that House was in the other direction, and he had some sources open to him which, though not official, were, he thought, reliable. If it were the fact that the German nation had studiously complied with its obligations and limitations under the Treaty of Versailles and that there was today to be seen in Europe no great programme of aerial construction, then, once again, one must examine the existing European situation, and the result could not, he thought, be such as to lead them to be more content with the figures which he had given.

Viscount Haldane said we should have a proper home defence force against air attacks. It was a difficult problem, and would take time to solve. He would like the Government

to concentrate at first on building up a first-rate Air Staff. There were admirable young officers in the Navy and the Army who could be brought into the service of the air.

On the question of expense, he said that he had read in the Press recently that it was proposed to spend £9,000,000 on naval works at Singapore. That might be most desirable but to begin with such an expenditure and pass by the much more pressing expenditure on the small air force that was required for the defence of the country seemed to him to be insanity. The Air Force should come first.

The Marquess of Salisbury, in reply, said that whatever might have been the reason—good, bad, or indifferent—which led the late Government to their decisions in respect of the Air Force at the moment of demobilisation, the difficulty for the present Government remained the same. They found a situation where the country had been deprived of the wonderful Air Force which it had enjoyed at the close of the war, and they were obliged to apply themselves to a situation which required a very extensive remedy.

As to the specific question about Germany, there was no reason to suppose that the German Government was contravening the Versailles Treaty. It seemed, however, to be the case that the German aircraft industry was being to some extent developed outside Germany. There were present in use in Germany 111 commercial machines, of 30 different types; 84 of them being the old type of military machines. Commercial machines in the course of construction all complied with the rules drawn up under the Treaty, with the exception of the airship which was being built in Germany for the Government of the United States. It would be premature to make any statement as regards the standard required. He hoped that on that point and others, at no distant date, he or somebody speaking on behalf of the Government would be able to go a great deal further. The noble and learned lord's remarks were directed to a comparison between our strength and the strength of a friendly Power. Undoubtedly, the air strength of any Power, friendly or otherwise, must react upon ourselves. But he would be sorry indeed if there was any idea that we were creating our Air Force because of any threat of aggression by that great friendly Power. The condition of Europe was still one of great tension, and it would be quite wrong, having regard to her very natural desire to exercise every precaution which a country was called upon to exercise, to complain that France had created so important an Air Force.

As far as the present Government was concerned, they had lost no time, but they were anxious to carry public opinion with them in whatever they did. The Air Estimates provided for an increase of 18 squadrons, and the provision of these would be pushed on with all dispatch. The Committee which had been appointed had been divided into two branches, and together they had had 16 sittings since the last debate. They had dealt with every part of the subject—the development of aircraft, range of aircraft, provision of personnel, relation to the Navy, and, most important of all, what the total strength of the Air Force should be. The Government had come to the conclusion that a considerable increase in the Air Force would be necessary. He could assure their lordships that whatever was necessary the Government would do their best to supply.

Mr. Tilghman Richards Disengaged

MR. TILGHMAN RICHARDS wishes it to be known that he is open to consider the offer of a position in the aircraft industry, preferably on the works management side. Mr. Richards is, of course, so well known as to need no introduction

from us, having been associated with flying since the very early days. Manager of the aviation branch of Beardmores until that was closed down, Mr. Richards was manager of Martinsydes of Woking, which position he has now relinquished.

LIGHT 'PLANE AND GLIDER NOTES

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of *FLIGHT*, who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.

It is rather amusing to see the *Daily Mail* advertising for a name for light aeroplanes to take the place of "motor-glider," and some of the suggestions sent in are—well, enough said. When we protested against the word "motor-glider" we hardly expected to be proved correct so quickly. However, the confusion over Barbot's flight demonstrated the unsuitability of "motor-glider," and now the way seems open to a good name for the latest type of aeroplane. Whether the word light 'plane or some other equally descriptive name is chosen does not really much matter, but it seems to us that light 'plane is as good as anything.

THAT was a most successful meeting at the Institution of Aeronautical Engineers on Friday last. Not only was the paper read by Maj. Wright a very interesting one, but the discussion proved very illuminating also, not to mention the "unofficial" discussion that followed the discussion. Perhaps this was, on the whole, the most interesting part of all. One met a lot of people who had seriously gone into the subject of the light 'plane, and from conversations that took place and views exchanged it would appear that there is a general consensus of opinion that, whatever may be the future of the light 'plane as a commercial proposition, from the scientific and sporting points of view it will be well worth developing.

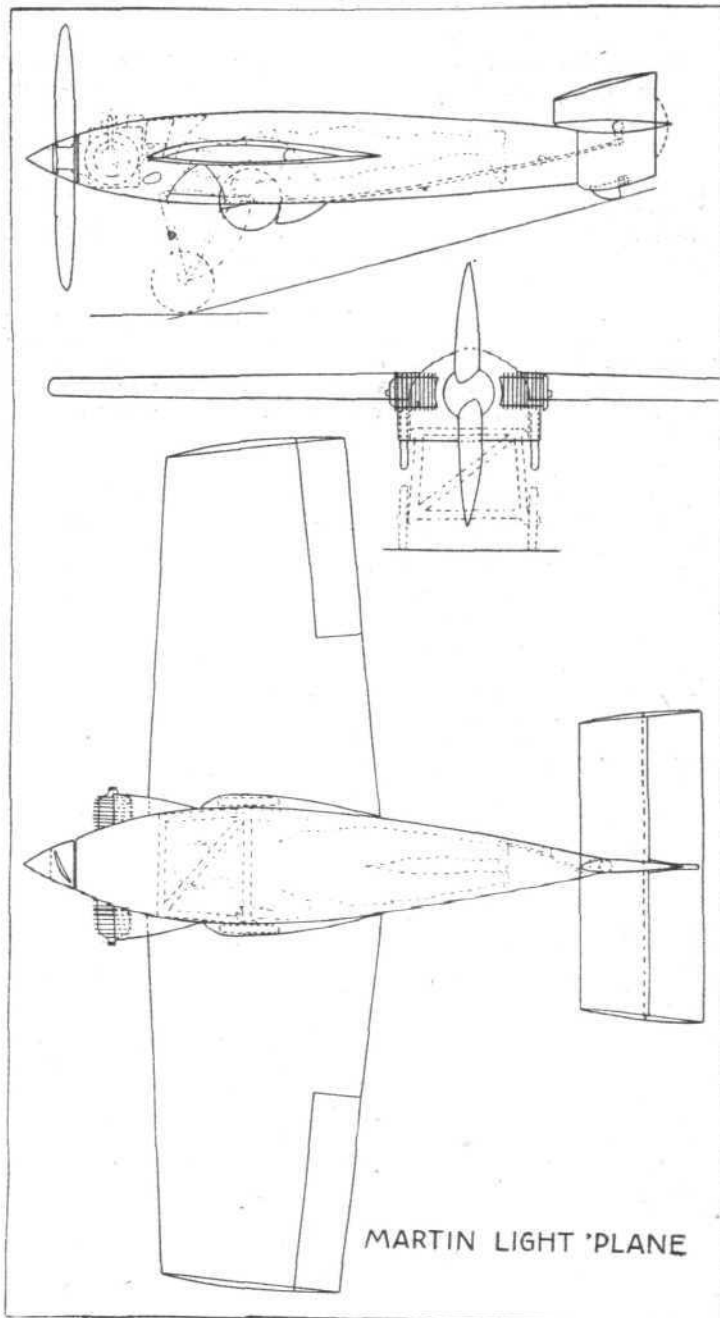
THE greater portion of Maj. Wright's paper is published elsewhere in this issue, as is also a report of the discussion, but perhaps a few items of news, which did not emerge from the latter, may be of interest.

WE were informed that Capt. Sayers has designed two light 'planes for the forthcoming competitions. It is gathered that these are much on the same lines as the Sayers-Courtney-Wright glider of last year. The machines are being built by Handley Page, Ltd., and we understand that they are to be fitted with slotted ailerons of the Handley Page type. On the "Hanley" these ailerons have proved most effective, so that there is justification for hoping that they will be equally effective on a light 'plane.

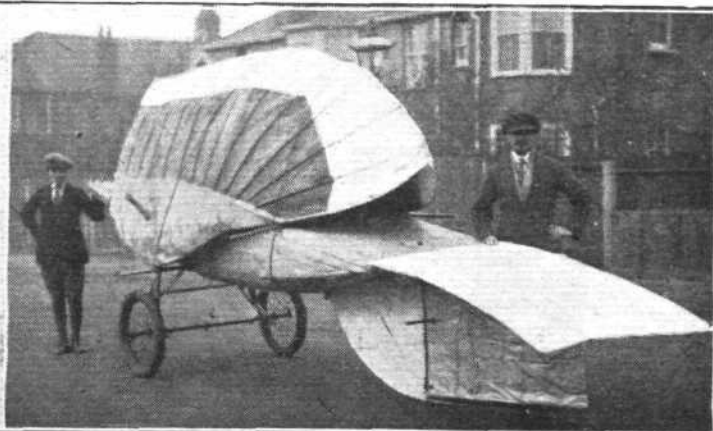
AVRO's are almost certainly building a machine for the competitions, and one gathered that Mr. Chadwick, after going into the subject very carefully, is rather in favour of the biplane, as giving a lighter structure, smaller overall dimensions, a narrow wing chord with small travel of the c.p. and other similar advantages. Others seemed to accept the clean cantilever monoplane as the right solution, and as there is a good deal to be said for both sides, we may hope to see quite a diversity of types at the competitions.

MAJ. O. T. GNOSSELIUS, who is one of the pioneers of British aviation, has designed a monoplane to take a Blackburne 700 c.c. engine. This machine is nearing completion at the works of Short Brothers at Rochester, and incorporates a number of unusual features. It is hoped to give a detailed

description of this machine in a forthcoming issue of *FLIGHT*. This machine was designed before the prizes were announced, but will almost certainly take part in the competitions.



"THE LIMIT": This sketch-design, by Mr. James V. Martin, shows the head resistance of a light 'plane cut down to a minimum by making the fuselage of just sufficient proportions to enable the pilot to lie stretched out inside. The undercarriage folds up into the fuselage.



THE PASSAT GLIDER: One of these views shows the glider with wings folded ready for transport.

HAVING by now parted with the "Wren," which has been "officially taken over by the Air Ministry," Mr. Manning is without a light 'plane at the moment, but it is scarcely to be supposed that he will be able to refrain from producing a successor to the "Wren," having already obtained such excellent results, and we may, therefore, confidently look forward to at least one Manning-designed machine having a try at the Sutherland and Daily Mail Prizes.

THE de Havilland Aircraft Co. had designed a light 'plane before the present large prizes were offered, and it seems likely that at least one D.H. light 'plane will be constructed in time to take part. We have been told in confidence what type this machine is likely to be, but at present it is not permissible to give details. We think, however, that Mr. Walker rather takes the same view as Mr. Chadwick, that there is comparatively little to choose between the cantilever monoplane, the braced monoplane and the biplane.

THE light 'plane designed by Mr. Shackleton for the Air Navigation and Engineering Co., of Addlestone, has already been described in FLIGHT, and it is scarcely to be doubted that one of these machines, fitted with an engine coming within the cylinder capacity stipulated, will be entered.

IN addition to those mentioned, there is a probability of several other aircraft firms building machines for the competitions, and probably not a few amateurs will build machines, so that it may be hoped that the entries list will be a very good one. It should not be forgotten that the Daily Mail prize is international, and that consequently it is likely that several foreign competitors will take part. Barbot will almost certainly do so on the Dewoitine, and it seems likely that M. Peyret will enter a machine. Hanriots are completing a light 'plane—or *avionette*, to give it its French name—and several other French constructors are interested in this type of machine. It seems doubtful whether any entries will be received from Germany, as the cost of building even such a small machine is rather high in Germany at the present day. There is, however, a probability that one or two Dutch machines may be coming over. Fokker is almost sure to send at least one, and Frederick Koolhoven is rumoured to be a possible competitor.

THE other day we had a visit from Mr. James V. Martin, who may be remembered as being associated with the Grahame-

White Co. at Hendon in the old days, but who has since established himself in America. Mr. Martin is, we gathered, over here in connection with certain patent rights, of which he holds a great many. Among these are patents for retractable undercarriages, and Mr. Martin very sportingly offers the right to use his patents, free of charge, on small machines up to a size requiring undercarriages weighing 50 lbs. Those interested should write to him at the Martin Aircraft Corporation, Garden City, N.Y., U.S.A.

JUST by way of indicating how the retractable undercarriage might be used in connection with the forthcoming competitions, Mr. Martin has got out the accompanying sketch-design, which shows a small monoplane driven by a two-cylinder opposed cycle engine. The fuselage is of very small cross-sectional area, and the pilot lies stretched out full length on the floor. He obtains a good view downwards through the opening in the floor, but the view forward through the small windows would be somewhat inadequate. The undercarriage tucks up inside the fuselage. The position would not be very comfortable for the pilot, and seeing the ground whizz past underneath would scarcely be conducive to good landings. However, the idea certainly seems to have the advantage of reducing head resistance to a minimum, and consequently we have called the machine "The Limit." This name, it should be pointed out, was given to it by us, and not by Mr. Martin. A frivolous member of the Editorial staff suggests that another great advantage of this design is that the pilot can order beforehand the sort of "finish" which he prefers—oak, walnut or matt black with silver fittings—and all that will be necessary at the end of the flight will be to remove from the cof...fuselage the few bits of wing roots, tail, etc., that remain.

INCIDENTALLY, this idea of the reclining pilot is not new. Long before the War, somewhere about 1912 or so, Mr. Fred Koolhoven, who was then associated with the British Deperdussin Company, showed us the g.a. drawings of such a machine. It was, however, never built.

M. PASSAT, of Raynes Park, has built a glider with bird-shape wings, which he is willing to lend to any practical pilot who wishes to experiment. A feature of the design is that the tail is not controlled, longitudinal balance being obtained by moving the wings in a fore-and-aft direction. For lateral control the wings are twisted.

LONDON TERMINAL AERODROME

Monday evening, May 14, 1923.

PASSENGER traffic between London and Paris continues to exceed all previous records, and Handley Page Transport are at times hard put to it to find accommodation for all would-be air travellers.

The only disadvantage which the air traveller has suffered—that of being unable to carry large quantities of luggage—is now rapidly disappearing, and it has become no uncommon sight to see the motor-bus from London to the aerodrome arriving with its entire roof covered with huge cabin trunks which, by some conjuring trick, the Handley Page people manage to store away in their big machines.

On the London-Brussels-Cologne service of the Instone Air Line traffic is also assuming big proportions, and the general rule now, for machines outward bound to Cologne, is "full up." In fact, looking through the records on Saturday, it was found that, out of every half-dozen machines leaving, there was only one that did not carry absolutely full load.

Today (Monday) the Instone Air Line commence their summer service, and two machines a day will leave Croydon for Cologne. One of these, leaving at 10 a.m., will be a non-stop to Cologne, while the other will call on the way at Brussels. The non-stop machine returns the same day, thus covering a distance of about 650 miles in the course of the day's flight.

The Daimler Airway have now got their service to Amsterdam, Bremen, Hamburg, and Berlin in full working order, although we have not as yet seen the German machine arrive at Croydon on the regular service. Every day this week there are passengers booked through to Bremen, Hamburg, or Berlin, and there is every sign that when this route becomes more widely known there will be ample traffic.

Increasing Consignments of Bullion by Air

THE exportation of gold by air continues to grow and is now assuming considerable proportions. On one day last week it was necessary to send, in addition to the usual Daimler and Fokker machines in the morning, an extra Fokker machine to deal with the goods traffic, whilst divided

between these three machines was bullion to the value of £100,000 in gold bar.

The traffic between Manchester and London has fallen off to a remarkable degree, and the Daimler Airway have been approached by an influential section of the Liverpool business community with a view to transferring the service from Manchester to Liverpool. This change would have many advantages, as not only would it appeal to Liverpool business men, but also to the vast number of travellers arriving at Liverpool by boat from all parts of the world. In addition, it would form a jumping-off place for an extension of such a service to Ireland. Under this threat of a closure of the Manchester service, the Manchester newspapers are taking up the question with great vigour, and are endeavouring to get more Manchester business men to give their patronage to the airway in the hope of retaining the service for their own city. The position at present, therefore, is very interesting, and further developments are awaited with interest.

There is no falling off in the quantity of goods which the Air Union are carrying between London and Paris, and this, with the seasonal increase of passengers, is giving the officials of this line a busy time.

Super-Rapid London-Brussels Flight

ON Friday the Instone D.H.4A, which won the King's Cup in the circuit of Britain race, flew from London to Brussels with two passengers, piloted by Mr. Powell, in a flying time from aerodrome to aerodrome of about 90 minutes. This, I believe, is a record for a passenger-carrying machine.

Mr. F. Courtney left here during the week, piloting a Jaguar-Siskin which he was flying out to Madrid for the Spanish Government. By way of a farewell stunt he indulged before leaving in a remarkable climb.

The Surrey Flying Services have now got their Portsmouth "joy-ride" ground in full working order, and have also been reasonably busy during the week-end with joy-rides at Croydon, although the cold weather rather spoilt their business.

CYCLE ENGINES FOR LIGHT 'PLANES*

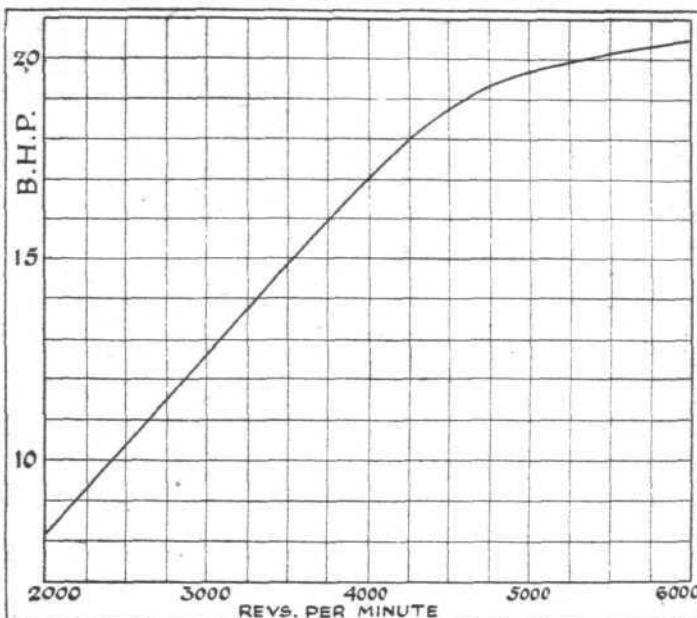
The 500 c.c. Douglas Flat Twin

FROM Douglas Motors, Ltd., of Kingswood, Bristol, we have received a few particulars and the accompanying photographs of the 500 c.c. overhead valve flat twin Douglas cycle engine. The makers produce, in addition to this type, a 350 c.c. model and a 750 c.c. model, of very similar design. For light 'planes, however, they recommend the 500 c.c. model, as this has been thoroughly tested for considerable periods at 4,000 r.p.m., at which speed, according to the accompanying power curve, the power developed is 17 b.h.p.

The makers state that they will be pleased to supply this engine to any experimenters, providing they receive an assurance that the engine will not be fitted in any motor-cycle frame other than a Douglas. They recommend that the engine should be run at 4,000 r.p.m. and that the propeller be geared down by chain transmission. The weight of the Douglas 500 c.c. engine is stated by the makers to be 58 lbs., complete with magneto, carburettor, and controls, but without flywheel. Assuming the flywheel to weigh about 10 or 12 lbs. the total weight would be in the neighbourhood of 70 lbs., which is fairly heavy, but not excessively so in view of the power developed. Probably what the makers have in mind in recommending running the engine at 4,000 is that this is a maximum for continued running. Presumably, for a few minutes during taking off there would be no harm in running at close on 5,000 r.p.m. Thus, assuming 17 b.h.p. as a normal maximum, the engine weight is only just over 4 lbs./h.p. For cruising probably it would be throttled down to about 2,500 or so, developing about 10 h.p. The petrol consumption (average) is given as .65 pint/b.h.p./hour, and at a cruising speed of something like 55 m.p.h. the mileage would probably be at least 60 miles per gallon.

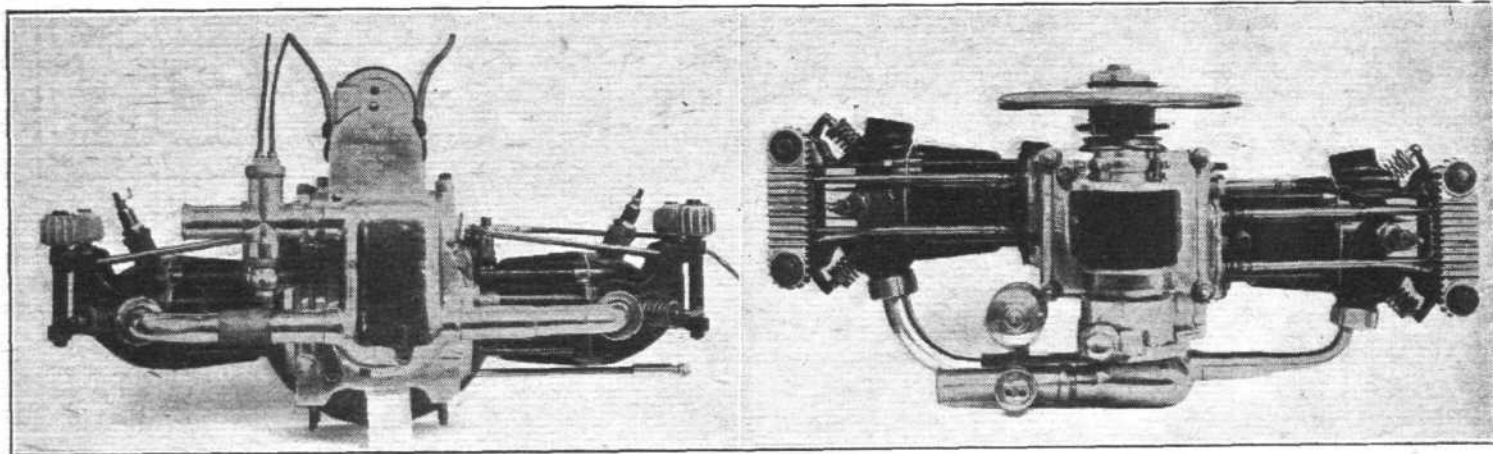
As regards the engine itself, this is of fairly orthodox design, with two valves (in the head) per cylinder. The valve-rocker spindles are enclosed in ribbed casings, presumably containing oil, and the cylinder heads are detachable, the whole unit

mission to an overhead propeller shaft should be fairly easily arranged, while the exhaust valves would face forward where



Power curve of the 500 c.c. Douglas engine.

they would get a maximum of cooling. The carburettor has its air inlet pointing parallel to the port cylinder (regarding the engine as an aero engine and not as a cycle engine), and



Two views of the 500 c.c. Douglas engine.

being held down by long bolts to the crank-case. The flywheel is on the exhaust side of the engine, so that chain trans-

* Illustrated descriptions of engines in this series have appeared in *FLIGHT* as follows. April 19, 1923, the A.B.C. 400 c.c. flat twin and the 700 c.c. Blackburne Vee. April 26, the Coventry Victor flat twin of 688 c.c. May 3, the Bradshaw, oil-cooled 500 c.c. flat twin.

An Old-Timer Coming Back

QUITE by accident we ran up against one of the old-timers the other day in the street. After the usual exclamations, questions, and answers it transpired that aforesaid old-timer, Eardley Lawford, who, apart from being one of the pre-war Hendon pilots, was one of the heroic band of pilots who demonstrated to a wondering world what could be done in the way of air transport when Mr. Holt Thomas started the A. T. and T. in 1919, thought that he could be happy away from aviation, and is now beginning to find that he can't. After doing exceedingly good work for the A. T. and T., Lawford retired from actual flying and turned his attentions to more prosaic pursuits, chiefly out of consideration for his old mother. He was never quite happy, however, in work

could probably be so arranged as to project through the engine cowling, thus avoiding fire risk due to backfiring.

Anyone desiring further particulars of this engine should apply to the makers, Douglas Motors, Ltd., Kingswood, Bristol.

that did not have about it a smell of petrol and oil, and has now decided that there is nothing for it but to return to aviation. Lawford needs no introduction to the aircraft industry, and the mere mention of him being willing to return "to the fold" should be sufficient. He will undertake piloting if necessary, although he would, we think, prefer some ground job in the experimental department. It might be mentioned that, apart from being a good pilot, Lawford is a wizard with machines and engines, and in the old days, when he was at Farnborough, it used to be said that if he could not tune-up a machine then certainly nobody else could, and the 'bus had better be burnt. If any firm wants a really good man, with ten years' experience, and will write to the Editor of *FLIGHT*, letters will be forwarded promptly.

"FLIGHT" GLIDER DESIGNING COMPETITION*

From the designers of "Turkey Buzzard," Roy G. Miller and D. T. Brown, of the Naval Aircraft Factory, Navy Yard, Philadelphia, Pa., U.S.A., we have received the following letter:—

"Your criticism of the landing gear is logical, and no doubt the substitution of wheels for skids would be an improvement. We were a little dissatisfied with the relatively great weight required for the landing gear, and seriously considered both alternatives of using external braces and of reducing the track. It was decided, however, that the braces would lead to complicated fittings, and that any reduction in the track would increase the liability of damaging the wing tip in landing. It seems that these features are well worth the price of the weight (about 2 lbs.) involved in the torque tube or axle.

"It is frankly hoped that no amateur will attempt to arbitrarily increase the control surfaces as you suggest, as any deviation from the original design may lead to structural weakness. The designers determined the area of these surfaces by the use of Hunsaker's coefficients, and then added a liberal allowance because it was thought that a glider should be more controllable than the equivalent airplane, especially so without the influence of the slip-stream on the tail. It is our claim that a given area of movable surface as used on the 'Turkey Buzzard' is more effective than an equal area divided between fixed and movable surfaces. This difference would be especially true at high angles where the fixed surface has a tendency to blanket the movable surface.

"We also hope that your advice will not be followed in the addition of fuselage fairing strips. These stringers would have to be supported by the middle portion of the fuselage struts, and the tautness of the fabric covering would tend to bow the struts inward and lead to structural weakness. The greatest unsupported width of fabric is less than 8 ins., which should not be serious, and certainly in no way comparable to the rectangular section as you suggest, since the unsupported width of fabric would then be at least three times as great."

As regards the area of control surfaces, we still think that these will prove too small, but, on the other hand, there is very good reason for the designers' fears that any great increase in the areas might lead to structural weakness; and as the behaviour of control surfaces, notably rudders and ailerons, may, even in these relatively enlightened days, be classed among those that puzzled the ancient philosopher, perhaps it would be better to leave them as originally designed, finding out by actual experiment whether or not they are sufficiently effective. Most gliders are fairly good on the elevator control, and we have an idea that the relatively poor effect of the rudder on most of the Itford gliders may have been due to the placing, almost universally adopted, above a one-piece elevator. In "Turkey Buzzard" the fuselage terminates in a vertical knife-edge, and the rudder extends downward to the level of the bottom of the fuselage.

As regards adding stringers on the sides of the fuselage, we still think this would be an improvement, even if it should prove necessary to put in light cross-struts joining the centre of the vertical struts on one side to the centre of those opposite to prevent bowing the struts inward.

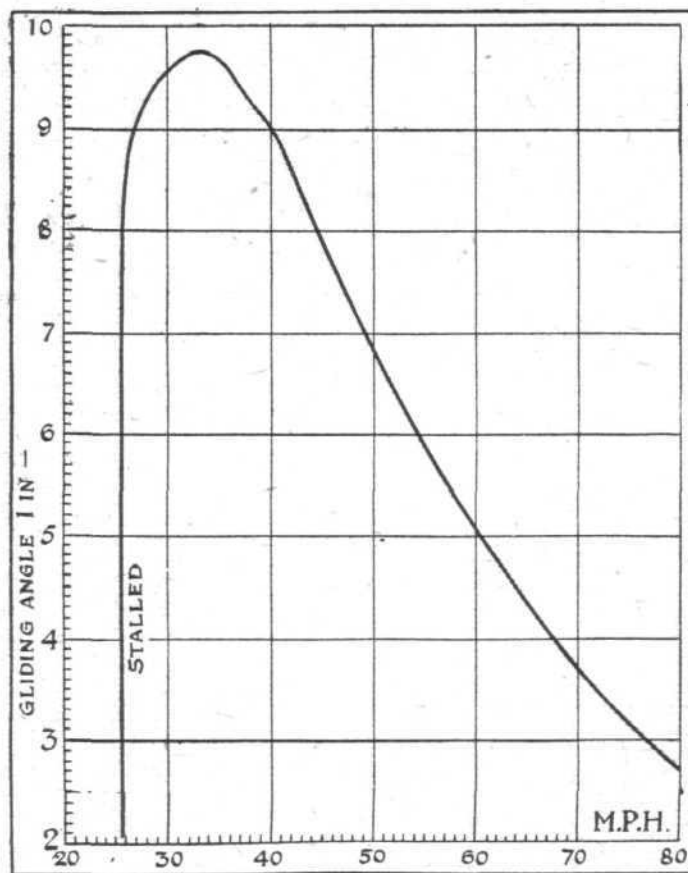
* The general arrangement drawings of "Turkey Buzzard" were published in our issue of April 12, 1923; performance calculations, fuselage construction details, etc., on April 19; details of the wing construction on April 26; wing fittings, elevator details, controls and tail skid on May 3; and details of the undercarriage on May 10.

The French Aeroplane Accident

ONCE more aviation has sustained a heavy blow by the disaster which overtook the "Goliath" F-AEBY on May 14. It appears that the machine had left le Bourget aerodrome at 12.35, and that wireless messages were being received from it up to 1.30. It is difficult to discover what actually happened, but, according to eye-witnesses, a wing broke in the air. This observation appears to be substantiated by the fact that a wing was found a considerable distance from the wreck. The occupants were killed instantly, but at present there does not appear to be any reason to think that they were burned to death, as the violence of the impact would be sufficient to cause instant death. The machine was piloted by M. Francois le Men, who had with him as engineer M. Pierre Jobert. The four passengers were: M. Emile Pierrot, technical director of the Air Union Company; Mr. Laurence Schwab, of Brooklyn, N.Y.; M. Ilmanen, a Finlander; and Miss Juanita Bates, of Ithaca, N.Y.

"K_L" Biplane Glider

THE general arrangement drawings of the second prize-winning design, "K_L," by Mr. Ashfield, were published in our issue of April 12, 1923. Further details have been promised by the designer, but it should be pointed out that, of course, the award was made on the material originally sent in, i.e., the general arrangement drawings, the calculations and the two sheets of construction drawings for fuselage and wings respectively. These drawings will be published



"K_L" BIPLANE GLIDER: Curve of gliding angles.

next week, and it will be seen that they are somewhat sketchy, especially the fuselage drawings.

The fuselage covering is intended to be three-ply birch 1 mm. thick, stiffened by light spruce struts as indicated. So far no particulars have been given of the size of longerons, struts, etc., but we hope to obtain these from the designer in time for inclusion in next week's issue. By that time details of the tail may also be forthcoming.

The wing drawings are fairly complete, and should, in the main, be self-explanatory. The wing section used is that known as No. 64. We understand, however, that the designer is contemplating the substitution of R.A.F. 15 section if his calculations should indicate this section to be more suitable.

As none of the occupants survived it will probably never be known for certain what took place, but the theory has been advanced that possibly a valve broke, and that a fire in the carburettor spread to the rest of the machine. Another theory is that a propeller broke, and in so doing broke some other part of the machine. At present the evidence does not appear to be at all clear as to whether the machine was actually on fire in the air, or whether the fire broke out when the machine hit the ground. It is stated that the body of the mechanic, M. Jobert, was found some distance away from the wreckage, and did not show any signs of burns, which fact is taken to indicate that he jumped from the falling machine. This theory also seems to indicate that the machine was not on fire while falling, but that the fire started as a result of the machine striking the ground.

Every effort is being made to discover the actual cause, but the difficulty of doing so with any degree of certainty is extremely great.

FLYING WITH LOW POWER

By Squadron-Leader MAURICE WRIGHT

A VERY interesting paper was read before the Institution of Aeronautical Engineers on May 11 by Squadron-Leader Maurice Wright, who took for his subject the very topical problem of flying with low power. The lecturer commenced by giving an outline of the way in which modern low-power flying differs from the performances achieved fifteen years ago. He recalled that the early machines had practically no speed range, their flying speed and landing speed differing by but a very few miles per hour. Instead of improving the aerodynamic qualities of the machines, progress was made chiefly by increasing the engine power. Then came the war, with its demands for various items of equipment and armament, which again detracted from the aerodynamic efficiency of machines, and performance was obtained by increasing the power of the engines.

Major Wright then went on to show how the restrictions placed upon Germany resulted in the subject of gliding being taken up, and how it was found that some of the German gliders had a sinking rate of about 3 ft. per second, which meant that they required only about 2 h.p. for flying level. Referring to the Itford meeting, the lecturer recalled that the high wind prevailing put a premium on controllability and enabled a machine with a relatively poor gliding angle to make the flight of longest duration. He thought that a standard Avro biplane with stationary propeller would have been able to soar successfully during that meeting. A series of lantern slides of various gliders was then shown, after which Major Wright turned to the first low-power aeroplane to fly in England, the "Wren," designed by Mr. W. O. Manning.

"According to calculations," the lecturer said, "this machine showed a possibility of flying level with the remarkably low power of $3\frac{1}{2}$ h.p., and this machine was designed as an experiment to see what could be done at the present day with the minimum h.p., and its construction was put in hand in order that information could be gained on how closely these figures would agree in practice with the calculations. When completed the aeroplane was taken out to a field having a rougher surface than the average aerodrome and astonished everybody (including the pilot) by leaving the ground with a run of not more than 50 yards against a breeze of 8 m.p.h. Three runs were made and each time the machine left the ground quite easily, but no protracted flights were attempted on account of the approaching darkness. The machine was then taken to Lytham for further trials. With a view to carrying out a straight flight from the sands to test the controls the machine was taken out in a 15 m.p.h. wind blowing along a narrow strip of sand which was gradually being eaten up by the in-coming tide. When the throttle was opened up gradually nothing much seemed to happen, but the last part of the travel of the throttle lever made the machine sit up and take notice and trundle along the sands. After she had covered about 6 ft. she began to accelerate so rapidly that she reached flying speed after covering about 30 yards. The pilot, however, kept her on the ground so as to have ample reserve of speed before lifting her clear, and as a result the total run taken in this case was about 50 yards. Once in the air she handled so well and was flying so strongly that it was decided to make a more protracted flight, and she was held at an air speed of just over 40 m.p.h., at which speed she was climbing strongly enough to reach a height of 100 ft. in quite a short time. The engine was then throttled down and the same air speed maintained, but, nevertheless, she did not stop climbing and reached about 300 ft. in approximately 5 minutes of leaving the ground.

"Shortly afterwards a landing was effected in a field by the side of a main road, where the wings were subsequently detached and the aeroplane taken in tow by a car.

"A word of explanation is perhaps due as to why a longer flight was not carried out, but it almost invariably happens that a new machine of an entirely new type requires minor adjustments after the first flight, and this aeroplane was no exception to the rule. It may be stated, however, that the adjustments required were of only a minor nature.

"If we look into the data obtained by these trials we shall see that the following facts have been clearly established:—

"(1) That an engine of 400 c.c. capacity is capable of taking an aeroplane and pilot together with approximately two hours' fuel off the ground without any external assistance.

"(2) That this machine has a speed range of approximately 23 to 50 miles per hour.

"(3) That the rate of climb is probably between 180 and 200 ft. per minute at sea level.

"(4) That there is every indication that it can fly level on half the available power.

"(5) That a direct-driven propeller running at 2,700 r.p.m. is not so inefficient as might reasonably have been supposed.

"It will be seen that two of the most important conditions that make an aeroplane a safe flying machine have been achieved, viz., a large speed range coupled with an adequate reserve of power, and a landing speed that will enable a forced landing to be carried out almost anywhere without risk of anything but minor damage to the machine.

"It is interesting to note that the speed range and reserve of power are superior to the majority of modern commercial aeroplanes.

"Enough experience has not yet been obtained to be able to give definite information on the question of controllability in rough weather, but there is no doubt that this machine has enough control to provide rapid manoeuvrability in calm weather.

"The low wing loading may possibly call for larger controlling forces than have been expected in order to retain the machine on its course in rough weather; in any case it must be expected that these machines will be more sensitive to air disturbances than those which are more heavily loaded.

"It must be remembered that continual operation of the controls will absorb a large amount of power and if a higher wing loading will reduce the amount of controlling required it may possibly pay to adopt it at the expense of a slight increase in the power required to fly level.

"On the other hand, the 'Wren's' loading of $2\frac{1}{2}$ lbs. per foot is not as low as some machines which used to fly quite successfully in pre-war days, in fact, the well-known Box Kite, with a 50 h.p. Gnome, had a similar loading and used to be capable of remaining the right way up in extremely trying weather conditions, in spite of the fact that its controls, stability and power reserve were not all that could be desired.

"Although the question of obtaining adequate control on these machines is looked upon as the most important problem to be solved, it is possible that further trials will show that the problem is not so serious after all, and that the lack of control shown by several of the lightly-loaded machines at Itford was due to the shape and disposition of the control surfaces rather than directly due to the light wing loading. It is also possible that the method of handling these machines should be slightly different from that which we are accustomed to on high powered aircraft. As an example, I suggest that rudder and aileron controls should not be applied progressively and kept in their position of maximum deflection until the machine is restored to an even keel, but that they should be applied in a series of deliberate movements from their normal position and not held in a deflected position for any length of time.

"I hope that Mr. Manning will give his views on this point and discuss the technical aspects of this suggestion by showing how the relation of drag due to controls may bear a larger relation to the available thrust than is the case with heavier aircraft which have a larger momentum.

"Having outlined the development of the light aeroplane up to the present time, it is proposed to deal with some aspects of the line to be followed in the future.

"In one respect it is regretted that this type of machine has not remained as an engineless glider a little longer, in order that the aerodynamic problems could be investigated a little more fully. It is certain that we have not yet reached the final stages of the development of aerofoil and body forms and the effects of these on one another, and experiments in gliding in still air would concentrate development in this direction in order that the performances could be improved upon. On the other hand, when once these machines take a power-driven form, there is a strong temptation to revert to the previous programme of boosting up the engine size and efficiency in order to obtain improvements in performance, and to neglect the aerodynamic side of the problem.

"It is to be hoped, therefore, that there will be no tendency to increase the engine power before serious efforts have been made to give the aeroplane its fair share of attention.

"With careful development I venture to suggest that it may be possible to build a single-seater machine which will

have the following performance with an engine developing a maximum h.p. of not more than 12:—

Top speed, 80 m.p.h. (at 500 ft).

Cruising speed, 60 m.p.h.

Landing speed, 28 m.p.h.

Ceiling, 8,000 to 10,000 ft.

Fuel consumption, 100 miles per gallon at cruising speed.

Useful load, 230 lbs.

Range, 360 miles.

Weight per h.p. at most efficient speed, 130 lbs.

"It will be necessary for a machine that is to fulfil the public demand for a utility aeroplane to be able to take off and alight in a field of average size and to be capable of having a sufficiently good climbing gradient from its point of departure to clear obstacles, such as high hedges, etc., on the boundary of the aerodrome. The required gradient will not necessitate a high rate of climb, as the ground speed of the machine will be low when climbing and, consequently, ratio of height gained to distance covered may be considerably better than is the case on many existing commercial machines.

"The run on the ground before flying speed is attained should not be excessive, if a large power reserve is obtained, but auxiliary devices, such as those employed on gliders, will enable a take off to be effected within a distance of a very few yards in cases where a very restricted space has to be used.

"The manoeuvrability of this class of aircraft should show to advantage when taking off from confined spaces, as it will be possible to carry out turns of a very small radius, and so enable the pilot to keep clear of obstacles until he has gained sufficient height.

"It will be necessary to pay close attention to the necessity of designing a machine which is capable of being easily transported along a road and which can be taken in and out of a field through a gate. It will not be possible to allow for any increase in structure weight when providing for this requirement, and it would appear that easily detachable wings will prove more suitable than folding wings on this account.

"The housing problem will not offer any serious difficulty if the overall height is kept down as much as possible. With detached wings the overall height should not exceed 5 ft. and a simple structure, somewhat similar to a chicken run in size, should be all that is required.

"The question of defining the limit of engine power for light aeroplanes for the purpose of classification will require very careful consideration. At the present time the volume swept by the pistons is used both in this country and in France for the purpose of limiting the engine power for competition rules. The limits are 750 c.c. in England and 1,500 c.c. in France. No limit is imposed on the maximum r.p.m. at which the engines may be run, and as a result it is difficult to obtain an estimate of the horse-power used without access to the power curve of each individual engine, and information on the r.p.m. of the engine at varying speeds.

"In making comparisons between the 'Wren' and Dewoitine machines much misunderstanding has arisen on account of the large difference in cubic capacity of their respective engines. The 'Wren' has an engine of 398 c.c. and the Dewoitine an engine of 1,130 c.c., but these figures do not give enough data to form an accurate estimate of the difference of horse-power employed for taking off and flying at full power, and it is necessary to obtain figures of the r.p.m. employed in each case before data for comparison is available. As a rough estimate it may be stated that the Clerget engine on the Dewoitine is running at 1,450 r.p.m. on the ground and at 1,650 r.p.m. when flying at 55 m.p.h. near the ground, whereas the A.B.C. engine on the 'Wren' is running at 2,600 r.p.m. on the ground and 2,900 r.p.m. at 51 m.p.h. near the ground. If these assumptions are correct the maximum power used by the Dewoitine is in the order of 15 h.p., and in the case of the 'Wren' the maximum used is about 8 h.p.

"Any suggestions for a suitable method whereby the machine can be classified according to the maximum b.h.p. developed with a given propeller will form a useful subject for discussion.

"In conclusion, it is to be hoped that a considerable amount of activity will be shown this year in connection with the light aeroplane and that much useful information will be gained as a result of the trials to be held in September."

The Discussion

Capt. W. H. Sayers explained that the C.S.W. glider designed by him for the Itford meeting of last year, and built by the Central Aircraft Company, was designed in about 19 hours and built in 19 days. Originally it had been intended to fit warp control, but it was found that the stresses on the rear sparhinge would be very severe, and it was decided to use ailerons. The wing design allowed of considerable flexibility, and he thought that the absence of any aileron

control was due to the fact that the wings warped in the opposite direction, thus neutralising the effect of the ailerons. He was at present building a new machine on similar lines, but with more rigid wings. He agreed with the lecturer that in a way the low-power aeroplane had come too soon, and hoped that we should not abandon gliders before something more had been learned than could conveniently be discovered in a power-driven machine.

Major O. T. Gnosselius referred to the early Avro machine, and to the fact that it had practically no reserve of power. With modern development we could fly with very small power, leaving a good margin in reserve. He did not wish to see designers stop at an L/D ratio of 18. If we could attain that we could probably attain a still higher figure, such as 1 in 25. In that case air transport should be the cheapest in the world. With regard to the absence of rudder control, he thought that was frequently the result of using a thick wing, which caused the rudder to work in a region of "dead" air. If high lift was required he thought it better to employ a section having a pronounced camber on the lower surface. The ideal to aim at was not to make the machine the motor cycle of the air, as had been suggested, but to make it the push-bicycle of the air. If the L/D could be pushed up to 25 or so that might be possible. He also called attention to the importance of the Air Ministry not hampering development by insisting on licences, certificates, etc.—a subject which we have repeatedly dwelt upon in FLIGHT.

Mr. Parrott, of Avro's, gave some interesting figures relating to the early Avro machines, and thought that the Jap engine of that time probably developed no greater power than the A.B.C. fitted in the "Wren." However, it seemed that it had taken quite a long time to beat those early performances of Roe's. With regard to Barbot's flight, he thought the petrol consumption was rather high, and mentioned Hinkler's flight to Turin, in which the Avro Baby, with 40 h.p. Green, did better than that.

Mr. Roy Chadwick, Chief Designer of Avro's, thought that in machines to be sold to the public the engine power should not be less than about 12 h.p., so as to allow of robust construction. For scientific purposes he quite agreed we should experiment with very small power. With regard to thick wings, high lift and controllability, he had gone into the subject rather carefully, and had come to the conclusion that the light biplane offered possibilities. You reduced the overall size, and the narrower chord would give better elevator control. Mr. Manning, by designing the "Wren," had shown the possibilities of the light aeroplane.

Dr. Hankin related some observations of vultures, stating that they actually did use their controls intermittently, as suggested by the lecturer, and did all their turning with the wing tips.

Mr. Howard Flanders gave a very interesting and amusing account of the early trials with the Avro, when one flight, one crash, one fortnight's hard work was the cycle of operations. He thought that if that early Avro, which was now in a museum in Manchester, were rebuilt, using better materials, it would probably fly today.

Mr. Tilghman Richards thought that instead of the meeting being for the purpose of discussing future development, it ought to have been a *résumé* of five years' work. All the factors in the light aeroplane had been known for years, and it was a curious psychological fact that it had not occurred sooner to anyone to produce a machine. With regard to the present machine, he described this as a petrified ornithopter, and expressed the opinion that the lack of control in gliders and light 'planes also existed in large machines, but we did not realise it.

Mr. W. O. Manning spoke on the subject of flicking the ailerons, and thought that by doing this quite possibly the momentary resistance of an aileron might be something like 35 lbs. at 40 miles per hour, so that a serious yawing moment might be produced. He did not agree with Major Gnosselius that lack of rudder control was due to thick wings. He also pointed out that with the small diameter of propeller it was likely that an angle of yaw of 3° would cause the rudder to come outside the slipstream.

Squadron-Leader Wright, in replying, stated that the wing section used on the "Wren" was T 64, with the ordinates stepped up. Thus it was a very thick section. Yet the "Wren" answered her rudder perfectly, both with engine on and with engine off. With regard to Barbot's petrol consumption, he pointed out that when the machine was standing at Lympne the petrol was running out, and that no attempt was made to make the double flight on a minimum of petrol. He thought the Avro Baby was the first machine to show really good fuel economy. On the question of controllability, the main difficulty was with rudder and ailerons. It appeared to be quite easy to get good elevator control.

THE ROYAL AIR FORCE

London Gazette, May 8, 1923

General Duties Branch

The following are granted short service commissions as Flying Officers for five years on active list, with effect from, and seny. of, dates indicated:—
J. Harston; May 1. J. G. Murray; April 28.

Flying Officer E. C. Brown resigns his short service commn.; April 4.
Gazette, April 6, concerning this officer is cancelled.

Gazette, Dec. 5, 1922, concerning Observer Officer B. G. Drake is cancelled.

Stores Branch

Flying Offr. H. W. Capener is granted a perm. commn. in rank stated for accountant duties; July, 4 1921. (Gazette, July 19, 1921, appointing this officer to a short service commn. is cancelled.)

The following are granted short service commns. as Pilot Offrs. on probation for accountant duties:—R. W. Freeman, F. C. Langley; April 26. E. C. Green, F. M. Hall (Lieut. R.N., ret'd.), J. H. S. Richards; May 1.

Medical Branch

The following are granted temp. commns. in ranks stated, with effect from and with seny. of April 25:—*Flt.-Lieut.* T. Sheehan. *Flying Offr.* K. R. Smith, M.D., D.P.H.

The following *Flying Offrs.* to be *Flt.-Lieuts.*: W. E. Barnes, C. A. Lindup;

May 8. *Sqdn. Ldr.* A. G. Higgins relinquishes his temp. commn. on ceasing to be empld.; April 24.

Chaplains' Branch

The Rev. C. O. R. Wormald, M.A., is granted a short service commission with the relative rank of Squadron Leader; April 16.

Reserve of Air Force Officers

Class A.—The follg. are granted commissions on probation in ranks stated in General Duties Branch (May 8):—

Flying Offrs.—J. S. Arthur, M.C., R. M. Clifford, C. E. V. Graham, M.C., C. H. R. Johnston, F. W. Knox, J. McRobert, E. O'C. Parsons, W. Ridley, D.F.C., P. D. Robins, A.F.C., W. H. Statham.

Pilot Offrs.—A. V. Blunt, J. G. Butt, C. H. H. Downing, W. A. Foot, J. C. Raine, M.B.E., R. Reynolds, C. J. Sanders.

Memorandum

C. G. Osborne is granted a temporary commission as Pilot Offr. for duty under Directorate of Works and Buildings; April 12. The permission to retain rank granted to the follg. *Sec. Lieuts.* is withdrawn on their enlistment in the Army:—G. A. Margetts; March 28. J. H. Walton; March 21. The permission to retain rank granted to *Sec. Lieut.* J. W. Rhodes is withdrawn on his enlistment in the R.A.F.; April 23.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:—

General Duties Branch

Wing Commanders: F. K. Haskins, D.S.C., to Superintendent of Reserves Headquarters, Northolt. 1.5.23, for duty as Superintendent of R.A.F. Reserves. A. H. W. E. Wynn, O.B.E., to Central Flying School, Upavon. 14.5.23, for Flying Refresher Course.

Squadron Leaders: R. P. Whitehead, to No. 27 Squadron, India. 15.3.23. P. P. Don, to Headquarters, Iraq Command. 11.4.23.

Flight-Lieutenants: K. H. Riversdale-Elliott, to Headquarters, Iraq Command. 8.3.23. G. H. Cock, M.C., to No. 8 Squadron, Iraq. 23.2.23, instead of to No. 84 Squadron, Iraq, as previously notified. N. Keeble, D.S.C., D.F.C., to No. 30 Squadron, Iraq. 23.2.23, instead of to Headquarters, Iraq Command, as previously notified. C. B. Dick-Cleland, to Station Commandant, Iraq. 23.2.23, instead of to No. 30 Squadron, Iraq, as previously notified. A. L. Chick, A.F.C., to Headquarters, Iraq Command, 16.9.21. L. G. Paget, A.F.C., to No. 45 Squadron, Iraq. 23.2.23, instead of to No. 55 Squadron, as previously notified. R. H. C. Usher, M.C., A.F.C., and C. V. A. Bucknall, both to Superintendent of Reserves, Headquarters, Northolt. 1.5.23. A. P. Ledger, M.B.E., to No. 11 Squadron, Andover. 4.5.23. H. H. James, to R.A.F. Base, Calshot. 16.5.23. A. G. Taylor, A.F.C., to No. 1 Flying Training School, Netheravon. 23.4.23. H. G. W. Lock, D.F.C., to No. 2 Squadron, S. Farnborough. 13.4.23.

Flying Officers: M. W. Nolan, to No. 20 Squadron, India. 15.4.23. R. W. H. Cook, to No. 20 Squadron, India. 5.4.23. W. G. Nicholls, to

No. 60 Squadron, India. 15.4.23. C. A. Mason and G. C. Sclater, both to No. 27 Squadron, India. 23.2.23, instead of to Aircraft Depot, India, as previously notified. (Hon. *Flt. Lieut.*) A. J. Carlielle, to Aircraft Depot, India. 14.3.23, instead of to No. 20 Squadron, India, as previously notified. S. H. Cooper, to No. 20 Squadron, India. 23.2.23, instead of to Aircraft Depot, India, as previously notified. H. N. Hampton, D.F.C., to Headquarters, Iraq Command. 1.8.22. E. L. Barrington, M.C., D.F.C., to No. 1 Squadron, Iraq. 23.1.23. J. A. McLaren, M.C., to Headquarters, Iraq Command. 23.2.23, instead of to Stores Depot, Iraq, as previously notified. G. H. Vasse, to No. 6 Squadron, Iraq. 3.4.23. G. H. Harrison, D.F.C., to Boys' Wing, Cranwell. 7.5.23. (Hon. *Flt. Lieut.*) J. E. Catherall, M.B.E., to Superintendent of Reserves, Headquarters, Northolt. 1.5.23. J. Harston, to R.A.F. Depot. 1.5.23. J. N. Jaques and C. C. Musselwhite, both to R.A.F. Depot. 15.5.23, whilst attending course at School of Army Co-operation, Old Sarum. D. R. Sharman, M.C., to School of Army Co-operation, Old Sarum. 15.5.23, for course of instruction. C. B. Bond, to R.A.F. Depot. 21.4.23, on transfer to Home Establishment. R. Lamb, to Noll Stores Depot, Kidbrooke. 30.4.23, for course of instruction. V. F. R. Hill, to Air Ministry. 1.5.23. F. A. Pumphrey, D.C.M., to R.A.F. Depot. 4.5.23, on appointment to a Short Service Commission.

Pilot Officers: T. J. Desmond, to No. 4 Flying Training School, E. ypt. 3.3.23. B. R. C. Coope, F. W. M. Downer, M. C. W. C. Flint, M.C., D. McG. Morphy, L. G. Pinnell, and R. G. Chapell, all to R.A.F. Depot. 15.5.23, whilst attending course at School of Army Co-operation, Old Sarum. L. K. Barnes, to R.A.F. Base, Leuchars (No. 401 Flight). 8.5.23.

IN PARLIAMENT

Herring Fishery and Aeroplane Observation

SIR ROBERT HAMILTON on May 1 asked the Under-Secretary to the Scottish Board of Health whether, having regard to the experiments carried out under the direction of the Minister of Agriculture in the months of October and November, 1921, and March, 1923, off the east and south coasts of England for the purpose of locating shoals of fish by observation from aeroplanes, and the statement of the Minister of Agriculture that further experimental flights are in contemplation, it can be arranged that these further flights be made during the summer herring-fishing season off the north coasts of Scotland and the Shetland Isles?

Capt. Elliot: The possibility of making arrangements for such experimental flights off the coast of Scotland during the coming summer is at present under discussion with the Air Ministry. My noble friend will communicate with the hon. member as soon as further information is available.

Airships

CAPT. WEDGWOOD BENN on May 7 asked the Prime Minister whether the Cabinet has come to any decision relative to the establishment of a company to run airships; and under the control of what Department of State would the operation of any such contract fall?

Mr. Baldwin: Negotiations are proceeding with the parties interested.

Capt. Benn: Can the right hon. gentleman say that no air work will be given to any Department other than the Air Ministry unless it is done with the consent of this House?

Mr. Baldwin: I could not say that. The question has not yet been decided.

Capt. Benn: Will the House be asked to ratify any such arrangement before a decision is arrived at?

Mr. Baldwin: I shall have to look into that, because I am not sufficiently familiar with the case to give an answer.

Aircraft and Engines

CAPT. W. BENN on May 10 asked the Secretary of State for Air whether money recently voted for purchasing aircraft and engines will be spent in the purchase of new types of aircraft and engines, or in re-purchasing and re-conditioning old war stock?

Lieut.-Colonel Sir Samuel Hoare: Over 83 per cent. of the total provision for complete machines and engines in the Air Estimates, Vote 3, will be spent on purchases of new types, the balance being for re-conditioning and, to a small extent, for re-purchasing a limited number of older types.

R.A.F. Pay and Emoluments

LIEUT.-COLONEL POWNALL asked whether he will take steps to compare from time to time the scale of pay and emoluments paid to members of the Royal Air Force with those paid to employes with similar duties in the large civilian air-transport services?

Sir S. Hoare: The differences in the organisation of a fighting service and a civilian transport company make it difficult to find classes or grades of personnel whose duties can fairly be described as similar. I am having the point investigated, but I can hold out no hope of any useful comparison resulting.

Aerial Defence

LIEUT.-COMMANDER KENWORTHY asked the Secretary of State for Air whether he stated in a speech on May 1 last that, judged by every standard of defence, our Air Force at present was not strong enough; whether this was his view before the present Air Estimates were framed; and what steps he is taking, or has taken, to remedy this state of affairs?

Sir S. Hoare: The answer to the first two parts of the question is in the affirmative. As to the third part of the question, I have included an addition of the equivalent of 18 regular squadrons in the Air Estimates of this year. A sub-committee of the Committee of Imperial Defence is at the present time considering the question of the necessity of further expansion.

Lieut.-Commander Kenworthy: Is the right hon. gentleman satisfied that with these extra squadrons our position will be safe?

Sir S. Hoare: That is exactly the question which the Sub-Committee of the Council of Imperial Defence are now enquiring into.

Lieut.-Commander Kenworthy: The right hon. gentleman made a statement with some knowledge, surely, in the speech referred to? Will his apprehensions be removed when these extra squadrons are provided?

Mr. Lambert: In view of the public interest in the matter, when will the Report of this Committee be published, or when will the House be put in possession of the facts?

Sir S. Hoare: The Committee has already held sixteen meetings, and we are sitting almost daily. Although I cannot be responsible for saying exactly when the Committee will report, yet I can say that there will be no undue delay. The Members of the Committee are anxious to make a Report as soon as possible.

Capt. W. Benn: Is it intended to provide additional squadrons by new Votes of money or by savings on other defence services?

Sir S. Hoare: I could not give an answer until the Committee has reported.

Civil Aviation and Germany

CAPT. W. BENN asked what are the international instruments governing the flight of civil aircraft over Germany; if copies are available; and what is the definition of civil machine, both as applied to British and German aircraft?

Sir S. Hoare: I assume that by international instruments the hon. and gallant member refers to conventions or agreements governing the flight of foreign civil aircraft into unoccupied Germany. On this supposition, the answers to the first and second parts of this question are that, so far as Great Britain is concerned, there is at present no permanent convention or agreement of this kind with Germany. Article 5 of the Air Navigation Convention of 1919, as it now stands, prevents the conclusion of any such agreement with a State which, like Germany, is not a party to the Convention. An amendment to this Article is under consideration by the contracting countries, but has not yet been ratified by all of them. The present flights of British aircraft into Germany are being carried out under a temporary and provisional arrangement for which it is proposed to substitute a detailed air traffic agreement as soon as the amendment to the Article referred to above has been ratified.

As regards the last part of the question, a civil machine is defined, so far as British aircraft entering Germany are concerned, as one designed for commercial use only, and not of a military type. As regards German aircraft, civil machines must conform to certain rules laid down by the Allied Powers in regard to power, ceiling, speed, fuel capacity, useful load and other matters.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS (London Aero Models Association)

IN acceptance of the invitation of the Dutch Society, the P.A.S.C., the Council, on Wednesday, May 9, elected their Competition Secretary, Mr. C. Bayard Turner, to represent the aeromodelists of Great Britain and give a practical demonstration of model flying at the Dutch national Competition for Model Aeroplanes, which will be held at Waalhaven Aerodrome on June 17.

It was overlooked last week the fact that Mr. Burchell has offered a very fine propeller for the best flight other than a prize-winning flight, which is made before Saturday evening, May 19. Judging to be on the loading times duration basis.

Practice flying took place during the week end, but the weather prevented any very meritorious performances. Members are reminded the entries for the "Gamage Cup" Competition must be received by the Competition Secretary before 8.30 p.m. on Friday, May 18.

Hon. Secretary: A. E. Jones, 48, Narcissus Road, West Hampstead, N.W. 6.

POWER PLANTS FOR MODEL AEROPLANES

By A. F. Houlberg

(Concluded from page 258)

Petrol Motors

I have, as yet, not seen a really good attempt at a model petrol motor of small size, the best example so far produced being the small V twin of Mr. Stanger, which until recently held the power-driven record with a duration of 53 secs. I can see no reason why a twin-cylinder motor of 1-in. bore by 1-in. stroke should not be made to work satisfactorily and comfortably develop $\frac{1}{2}$ b.h.p. with a weight not exceeding 2 lbs.

We will take the four-stroke engine first, and investigate the question of the best type for our purpose; we have for choice the single cylinder, the horizontally opposed twin, the side-by-side twin, and the 90° V twin. The single cylinder has bad balance with a bad torque diagram, and gains nothing on the score of weight, since it requires a fairly heavy flywheel to smooth its running; it can, therefore, be dismissed. The side-by-side twin has an even torque diagram and fairly good balance, but air cooling the cylinders evenly is difficult, as they are close together. The 90° twin has excellent balance but an indifferent torque diagram, although the cooling problem presents no difficulty. The H.O. twin has excellent balance, good torque diagram, is easy to cool adequately, and is undoubtedly the better type to use.

The problem of the best type of two-stroke is modified by the fact that one-power stroke per cylinder occurs in each revolution of the crankshaft. Thus we find that the two-stroke single cylinder has a better torque diagram than the single cylinder four-stroke, but its balance is no better. The side-by-side twin two-stroke, however, has a better torque diagram than any of the four-stroke types reviewed, while its balance is equal to that of the side-by-side four-stroke. The 90° twin two-stroke has a fair torque diagram and its balance is good, but the H.O. twin two-stroke has a poor torque diagram—in fact, no better than the single cylinder, although its balance is excellent. From this we see that the position of affairs is somewhat reversed, and the two-cylinder side-by-side is the best type for a two-stroke.

We now come to the question of ignition, and the problem of producing a light apparatus is without doubt the greatest difficulty we have to overcome if we desire to obtain small petrol plants. The magneto is useless, as it is too heavy and cannot be greatly reduced in size without reducing its output too much. The flywheel magneto can be made considerably lighter, but has the same restrictions on size reductions. The only scheme left is battery and coil ignition, a scheme which has successfully stood the test of time, and which is daily increasing in favour.

A trembler coil not more than 6 ozs. can easily be made, and with a dry battery weighing 4 ozs. gives an ignition apparatus weight of 10 ozs. With a motor weight of 2 lbs. this gives us a total weight of 2 lbs. 10 ozs., and if it develops $\frac{1}{2}$ b.h.p. we should obtain a thrust of at least 4 lbs., or considerably more than the total weight of the plant.

"Coming Events Cast Their Shadows," etc.

"MR. NEWBOLD, M.P., has been elected an honorary member of the Bolshevik Air Fleet."—*Daily Paper*.

"Well, he has only himself to blame."—*Punch*.

At the moment of going to press his Parliamentary future is distinctly, and rightly, in the air.

The Grand Prix Balloon Race

THIS year's Grand Prix for balloons was not very successful. A terrific wind was blowing at the time of the start on May 13, and out of the 20 balloons entered four were destroyed on the ground by the gale, while a fifth escaped as it was being filled. Out of the remaining 15 the one which appears to have made the longest journey is No. 3 ("Vieille Tigre"), which, piloted by Moineau, landed at Commercy (Meuse), having covered a distance of 295 kilometres (114 miles). Up to the present Veenstra's balloon has not been accounted for.

IMPORTS AND EXPORTS, 1922-1923

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January, 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; and for 1922 see "FLIGHT" for January 18, 1923.

	Imports		Exports		Re-Exports	
	1922.	1923	1922.	1923.	1922.	1923
Jan. ..	1,152	466	76,552	60,079	23	280
Feb. ..	567	641	69,129	120,236	1,100	3,040
Mar. ..	1,471	589	166,607	71,945	100	689
April ..	3,846	8,508	139,995	167,757	5,880	462
	7,036	10,204	452,283	420,017	7,103	4,471

[Note.—The trade returns for April are prefaced by a statement that from April 1, 1923, these accounts include the trade of Great Britain and Northern Ireland with the Irish Free State. From the same date the direct foreign trade of the Irish Free State has been excluded from these accounts.]

NEW COMPANY REGISTERED

AIR VENTURERS, LTD.—Capital £100, in £1 shares. Manufacturers and warehousemen of aeroplanes, etc. Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, Strand, W.C.

PUBLICATIONS RECEIVED

National Advisory Committee for Aeronautics: Report No. 157. Nomenclature for Aeronautics. Technical Notes No. 129. Notes on Aerodynamic Forces on Airship Hulls. By L. B. Tuckerman. March, 1923. No. 130. Model Supports and Their Effect on the Results of Wind Tunnel Tests. By D. L. Bacon. February, 1923. No. 131. Variation in the Number of Revolutions of Air Propellers. By W. Achenbach. March, 1923. No. 132. The Increase in Dimensions of Airplanes—Weight, Area, and Loading of Wings. By E. Everling. March, 1923. No. 133. Disturbing Effect of Free Hydrogen on Fuel Combustion in Internal Combustion Engines. By A. Reidler. March, 1923. The National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

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